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Photoluminescence Analysis of Electron Irradiated AlGaN/GaN HEMT structures with Variation of Silicon Nitride Passivation Thickness H. JACKSON, ROBERT HENGEHOLD, Air Force Institute of Technology — A passivation layer of silicon nitride on AlGaN\GaN heterojunction devices can improve performance by reducing electron traps at the surface. In this study, the effects of passivation layer thickness was investigated at various thicknesses (0, 200, 500 and 1200 Angstroms) on AlGaN\AlN\GaN structures. 1.0 MeV Electron irradiations at a fluence of $10^{16}\,\mathrm{cm}^{-2}$ were used to increase the electron trapping at the interface as well as examine the impact on transport and thus ascertain the quality of the interface. Additionally, pre- and post-irradiation photoluminescence spectroscopy was used to reveal near-band-edge shallow electron donors, neutral donor bound excitons ($D^0\ X_A$) as well as deep center yellow/blue bands. Correlation of the post radiation spectra will be made to other device characteristics as a function of Silicon Nitride passivation thickness.

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